

ENVIRONMENTAL ASSESSMENT

**NOXIOUS WEED MANAGEMENT
INTERSTATE 90 CORRIDOR**

**USDA Forest Service
Mt. Baker-Snoqualmie
and
Wenatchee National Forests
June 1995**

ENVIRONMENTAL ASSESSMENT

NOXIOUS WEED MANAGEMENT INTERSTATE 90 CORRIDOR

Prepared for:

USDA - Forest Service
Mt. Baker - Snoqualmie National Forest
North Bend Ranger District
42404 S.E. North Bend Way
North Bend, Washington 98045

USDA - Forest Service
Wenatchee National Forest
Cle Elum Ranger District
West 2nd
Cle Elum, Washington 98922

Prepared by:

Washington State Department of Transportation
Field Operation Support Service Center
Maintenance Office
PO Box 47358
Olympia, Washington 98504-7358

June 1995

TABLE OF CONTENTS

CHAPTER 1	1
PURPOSE AND NEED FOR ACTION.....	1
PURPOSE OF AND NEED FOR ACTION	1
Forest Plan.....	2
THE PROPOSED ACTION.....	4
Current Practices	5
DECISION TO BE MADE	5
PROJECT AREA AND SCOPE.....	5
PUBLIC INVOLVEMENT AND SCOPING.....	6
INTERDISCIPLINARY TEAM MEETING	6
CHAPTER 2	10
ALTERNATIVES INCLUDING PROPOSED ACTION.....	10
PROPOSAL	10
DEVELOPMENT OF ALTERNATIVES.....	11
ALTERNATIVES CONSIDERED AND ANALYZED IN DETAIL	11
Alternative A - NO ACTION.....	11
Alternative B - IWM, HERBICIDES EXCLUDED.....	12
Alternative C - IWM, ALLOWING APPROVED HERBICIDES	12
Items Common to Alternatives B and C.....	14
ALTERNATIVES CONSIDERED AND NOT ANALYZED IN DETAIL..	17
COMPARISON OF ALTERNATIVES BY AFFECTED RESOURCE	17
CHAPTER 3	20
AFFECTED ENVIRONMENT	20
SITE TYPES	20
RESOURCE DESCRIPTIONS.....	21
Vegetation	21
Human Environment.....	22
Fish and Wildlife	22
Soil and Water Quality	24
Economic Values	24
CHAPTER 4	25
ENVIRONMENTAL CONSEQUENCES	25
ALTERNATIVE A - No Action	25
Vegetation	25
Human Environment.....	26
Fish and Wildlife	26
Soil and Water Quality	26
Economic Values	27
ALTERNATIVE B - IWM Program, Herbicides Excluded.....	27
Vegetation	27
Human Environment.....	28

Fish and Wildlife	28
Soil and Water Quality	29
Economic Values	29
ALTERNATIVE C	30
Vegetation	30
Human Environment.....	31
Fish and Wildlife	31
Soil and Water Quality	32
Economic Values	35
BIBLIOGRAPHY	36

LIST OF TABLES

Table 1 - Treatment Strategies and Methods by Alternative	11
Table 2 - Classification of Noxious Weeds Within Project Area	15
Table 3 - Comparison of Alternatives by Affected Resource.....	18
Table 4 - PETS Plants within Proposed Project Area	21
Table 5 - PETS Fish and Wildlife Species.....	23
Table 6 - Relative Toxicity of Proposed Herbicides	32

LIST OF FIGURES

Figure 1 - Project Location Map	8
Figure 2 - WSDOT Roadside Management Zones	9

APPENDICES

Appendix A:	I-90 Noxious Weed Survey
Appendix B:	Noxious Weed Species
Appendix C:	Summary of Public Responses to Scoping
Appendix D:	Biological Evaluation for Wildlife
Appendix E:	Biological Evaluation for Plants
Appendix F:	Summary of Control Methods
Appendix G:	Biological Control in Pacific Northwest
Appendix H:	Herbicide Information Profiles
Appendix I:	Non-Chemical and Chemical Control of Knapweed
Appendix J:	Biological Control of Knapweed
Appendix K:	Inventory and Monitoring Forms
Appendix L:	Prevention Strategies
Appendix M:	Herbicide Mitigation Measures
Appendix N:	Effects On Plant Community Diversity After Herbicide Control of Spotted Knapweed
Appendix O:	Interdisciplinary Team Members
Appendix P:	Regional Forester's Determination of Project Consistency with the ROD
Appendix Q:	Public Comments and Forest Service's Responses to Public Comments of the Noxious Weed Management Interstate 90 Corridor Environmental Assessment

CHAPTER 1

PURPOSE AND NEED FOR ACTION

This chapter introduces a proposal by the Washington State Department of Transportation (WSDOT) to manage noxious weeds within the Interstate 90 corridor on lands administered by the Mt. Baker-Snoqualmie and Wenatchee National Forests. It addresses the following items:

- Defines the proposed action and discusses the purpose and need for the proposed action.
- Describes the scope of the proposal and the project area.
- Summarizes the scoping process and identifies the significant issues that were considered during scoping.

PURPOSE OF AND NEED FOR ACTION

The occurrence and spread of noxious weeds is a major problem for land managers across the Pacific Northwest. Increasing loss of forage for wildlife and domestic livestock, conflicts with natural biological diversity, forest health, recreational values, soil stability, and soil productivity are well documented (Lacey and Olson, 1991). Because of the nature of transportation corridors, the existence of noxious weeds on the roadside has regional implications. Increasing economic and environmental costs of uncontrolled noxious weeds has heightened public awareness and concern.

The purpose of this proposal is to control the spread of noxious weeds within the I-90 corridor to adjacent lands by reducing and/or eliminating existing noxious weed populations within the project area and controlling any new species introductions. The situation that exists today within the proposed project area demands action because of the combination of two factors:

- 1) The disturbed areas within the I-90 operational right of way are infested with noxious weeds and provide a large seed source.
- 2) The I-90 corridor acts as a conduit for the spread of noxious weed seeds to adjacent lands and throughout the corridor.

Virtually all disturbed areas within the I-90 operational right of way through National Forest land contain noxious weed populations with the densest infestations found immediately adjacent to the roadway. With an average of approximately 28,000 vehicles per day using I-90 a condition exists that is conducive to the movement of noxious weeds across the state. Unless this situation is corrected, and the spread of noxious weeds checked, the economic

viability of adjacent farm and range lands and the environmental quality of adjacent forest lands will continue to be threatened.

Noxious weed populations, once established, tend to expand at an exponential rate. By definition these weeds are non-native and as such are free from the natural predators that controlled populations in their native range. Noxious weeds negatively impact the environment in many ways, including the following:

- Reduce biodiversity by out-competing native plant species.
- Reduce forage for wildlife and domestic livestock by out-competing native plant species in forest and range lands.
- Reduce soil stability by displacing desirable grasses with better soil holding characteristics.
- Reduce range land values by reducing forage quality and quantity.
- Increase land management costs due to the need to control noxious weeds.
- Reduce visual quality by displacing native species.
- Some noxious weeds are poisonous to large mammals.

Because noxious weeds damage the environment, economy, and quality of life, the State of Washington requires that they be controlled on all state and private lands. State law, as defined in Chapter 17.10 of the Revised Code of Washington and Chapter 16-750 of the Washington Administrative Code, requires that the WSDOT control noxious weeds on their right of way.

The WSDOT has a noxious weed control program that has proven to be highly effective on State owned right of way. Due to budget and workforce constraints the WSDOT has not been able to dedicate the considerable resources that would be needed to achieve the same results within the project area, given the exclusion of herbicide use.

The USDA Forest Service also recognizes the need to control noxious weeds and has demonstrated this by making the control of these exotic species a goal of the Forest Plans for the Mt. Baker-Snoqualmie and Wenatchee National Forests. Present roadside vegetation management within the project area is not consistent with these goals.

Forest Plan

The project area is located within the Alpine Lakes Management Unit. Forest Plan Land Allocations, as amended by the Record of Decision and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (ROD), include Snoqualmie Pass Adaptive Management Area, Riparian Reserves, Late-

Successional Reserves, Scenic Forest, and General Forest. These land allocations are described below. Descriptions are excerpts from the Forest Plan as amended by the ROD. Refer to these documents for a more detailed description and for Standards and Guidelines for each land allocation.

Snoqualmie Pass Adaptive Management Area

The objective of Adaptive Management Areas is to develop new management approaches to integrate and achieve ecological and economic health, and other social objectives. The emphasis behind this objective for the Snoqualmie Pass Adaptive Management Area is to provide late-successional forest on the “checkerboard ownership” lands located within the adaptive management area.

Riparian Reserves

Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis. Riparian Reserves include those portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing water bodies.

Late-Successional Reserves in Administratively Withdrawn Lands

Areas withdrawn from timber harvest in the Forest Plan. The objective of this allocation is to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl.

Scenic Forest

The objective in Scenic Forest areas is to retain or enhance viewing and recreation experiences.

General Forest

Provide for long-term growth and production of commercially valuable wood products at a high level of investment in silvicultural practices.

Forest Plan goals for noxious weeds are to control them to the extent practical. Control methods include mechanical, biological, access restrictions to prevent spread, seeding disturbed soils, and use of herbicides. Small infestations of new noxious weeds are to be eradicated as soon as possible (Mt. Baker-Snoqualmie and Wenatchee Forest Plans Forest-Wide Standards and Guidelines, pages 4-135 and IV-89-92, respectively). This proposed project would be consistent with the Mt. Baker-Snoqualmie and Wenatchee National Forests Land Management Plans as amended by the ROD (Appendix P).

THE PROPOSED ACTION

The Washington State Department of Transportation (WSDOT) proposes to implement an Integrated Weed Management (IWM) program in accordance with the Regional Forester's selected alternative from the Environmental Impact Statement entitled "Managing Competing and Unwanted Vegetation" (USDA, 1988). The proposed IWM program is an action plan for the control of noxious weeds within the WSDOT maintained operational right of way on the Mt. Baker-Snoqualmie and Wenatchee National Forests. The proposed IWM program is to be implemented on approximately 160 acres of operational right of way over a 31 mile stretch of highway between mile posts 38 and 69 of the Interstate 90 corridor through the above noted National Forests. A more detailed site description can be found in the section of this document titled "Project Area and Scope".

In 1988 the USDA Forest Service Region 6 personnel wrote an Environmental Impact Statement entitled "Managing Competing and Unwanted Vegetation" (hereto referred to as Region 6 Veg. Mgt. EIS). The Regional Forester's selected alternative emphasizes the use of prevention and natural processes in noxious weed management. It makes available all tools for noxious weed control (manual, mechanical, biological, revegetation, chemical) but herbicides are to be used "only when other methods are ineffective, or will increase project cost unreasonably" (USDA, 1988).

The Region 6 Veg. Mgt. EIS and the subsequent mediated agreement established a five-step IWM process for project analysis (see page II-67, USDA, 1988). This process, as well as direction in other federal documents [1990 Farm Bill amendment to the 1974 Noxious Weed Act, 36 Code of Federal Regulations (222.8b), USDA Forest Service Manual (sections 2080-2082), and the Forest Plans (as amended by the 1994 ROD)] comprise the basis of the Forest's IWM program. The WSDOT proposes to adopt this program for operational rights of way within the National Forests.

The five-step IWM process is described on page II-67 of the Region 6 Veg. Mgt. EIS. The five steps are to conduct a site analysis, select a strategy, design the project, take action, and monitor. A noxious weed inventory has been prepared for the project site and the 6 questions from the Mediated Agreement, designed to analyze the strategies of prevention, are to be answered on the inventory forms. These forms will be made available in the analysis file.

With an IWM program, noxious weeds would be managed from an array of strategies (i.e., prevention, early treatment, correction, maintenance, and no action) and methods (i.e., education/awareness, human behavior changes, manual, mechanical, biological, revegetation, and chemical). Correction, prevention, and early treatment are the proposed strategies for the project site. Early treatment could include both direct (i.e., manual & herbicides) and indirect (i.e., habitat modification & human behavior changes) controls. The ultimate goal of the project will be to achieve a condition where prevention is the primary form of management.

Current Practices

Current management of the proposed project area does not include a dedicated strategy for the control of noxious weeds. In general, most noxious weed control is incidental to the standard right of way maintenance, with the exception of handpulling any new invaders that are spotted by maintenance crews. Standard right of way maintenance is limited to that which is necessary to insure the integrity of roadway and its associated hardware, and to provide a safe environment for highway users. Mechanical maintenance operations such as mowing and brushing have proven to be ineffective weed management tools even when timed to suppress seed head development. Many noxious weeds, particularly knapweeds, adapt to mowing by producing seed heads below the mowing height and further reduction in the mowing height only serves to damage the health of desirable grasses. Manual control of noxious weeds is limited to the early treatment of new invaders and has been determined to be impractical as a corrective measure against established populations given the extent of right of way infestation and maintenance budget constraints. The absence of an effective correction program greatly reduces the potential for an effective prevention program.

The checkerboard ownership pattern within the project area is reflected in the inconsistent treatment of noxious weeds within the I-90 corridor. The limitations placed on weed control activities on National Forest lands has created the situation where an effective noxious weed program exists on State land, but not on Federal land. Noxious weeds on Forest Service lands readily spread onto adjacent State rights of way and, therefore, increase management costs on those roadsides beyond what would normally be necessary.

DECISION TO BE MADE

The Forest Supervisors, for each of the subject National Forests, will jointly make the following decision based on the interdisciplinary analysis contained in this Environmental Assessment.

Should the IWM approach analyzed in this document be implemented as proposed, implemented in a modified fashion, or not implemented at all?

PROJECT AREA AND SCOPE

The project area consists of disturbed roadside areas within the I-90 operational right of way between mileposts 38 and 69 (see Figure 1). Right of way ownership through this area alternates between the USDA Forest Service and the WSDOT in a checkerboard pattern. The WSDOT has an operational right of way easement through National Forest land.

Disturbed areas, as referred to in this document, are defined as cut/fill areas, medians, and roadside shoulders of varying widths. Disturbed areas are typically referred to by the WSDOT as roadside management zones 1 and 2 (see

Figure 2). In general, these areas extend no more than 100 feet from the edge of the roadway. Disturbed areas are generally free of trees and brush. The WSDOT does not propose to include undisturbed areas in this project even though such areas may occur within the operational right of way. The total project area is approximately 160 acres in size.

PUBLIC INVOLVEMENT AND SCOPING

A letter which explained the purpose and need for the project was sent to 455 persons and organizations on the North Bend Ranger District, Cle Elum Ranger District, and WSDOT mailing lists. The WSDOT mailing list was established during the production of the Environmental Impact Statement entitled "Roadside Vegetation Management" (WSDOT, December 1993). A summary of responses to the scoping letter is included in Appendix C.

Significant Issues

During the scoping process, three significant issues were identified for analysis in this document:

1. Existing noxious weed populations are out-competing grasses and native plant communities within the roadsides of the Interstate 90 corridor. Some of these noxious weed species are toxic to large animals. As these noxious weeds move into adjacent lands there will be a serious negative impact on natural biological diversity. There is serious potential for adverse economic impact to agriculture and other plant-based industries on both sides of Snoqualmie Pass as well as to the adjacent National Forest system lands.
2. The existing infestations are large and spreading at an exponential rate. Control methods other than herbicide use have been tried on large populations of knapweed in eastern Washington but have not proved effective on infestations of this magnitude.
3. There is concern about the potential effects from the use of chemical herbicides. Concerns may include: off-target damage to plants, including endangered, threatened, or sensitive plants; impacts to ground and surface water; the health of humans, wildlife and fish; and impacts on soil productivity.

INTERDISCIPLINARY TEAM MEETING

An interdisciplinary team meeting was held on May 12, 1994 at the North Bend Ranger District. A listing of team members is included in Appendix O. This was a pre-work meeting to discuss project issues and coordination. Subjects discussed included:

- environmental documentation required,
- consistency with the ROD and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl,
- WSDOT and Forest Service Roles in the Environmental Analysis and documentation of the proposed project,
- time frames for completion of analysis and document,
- surveys for T&E Species,
- and summary of responses to Scoping Letter.

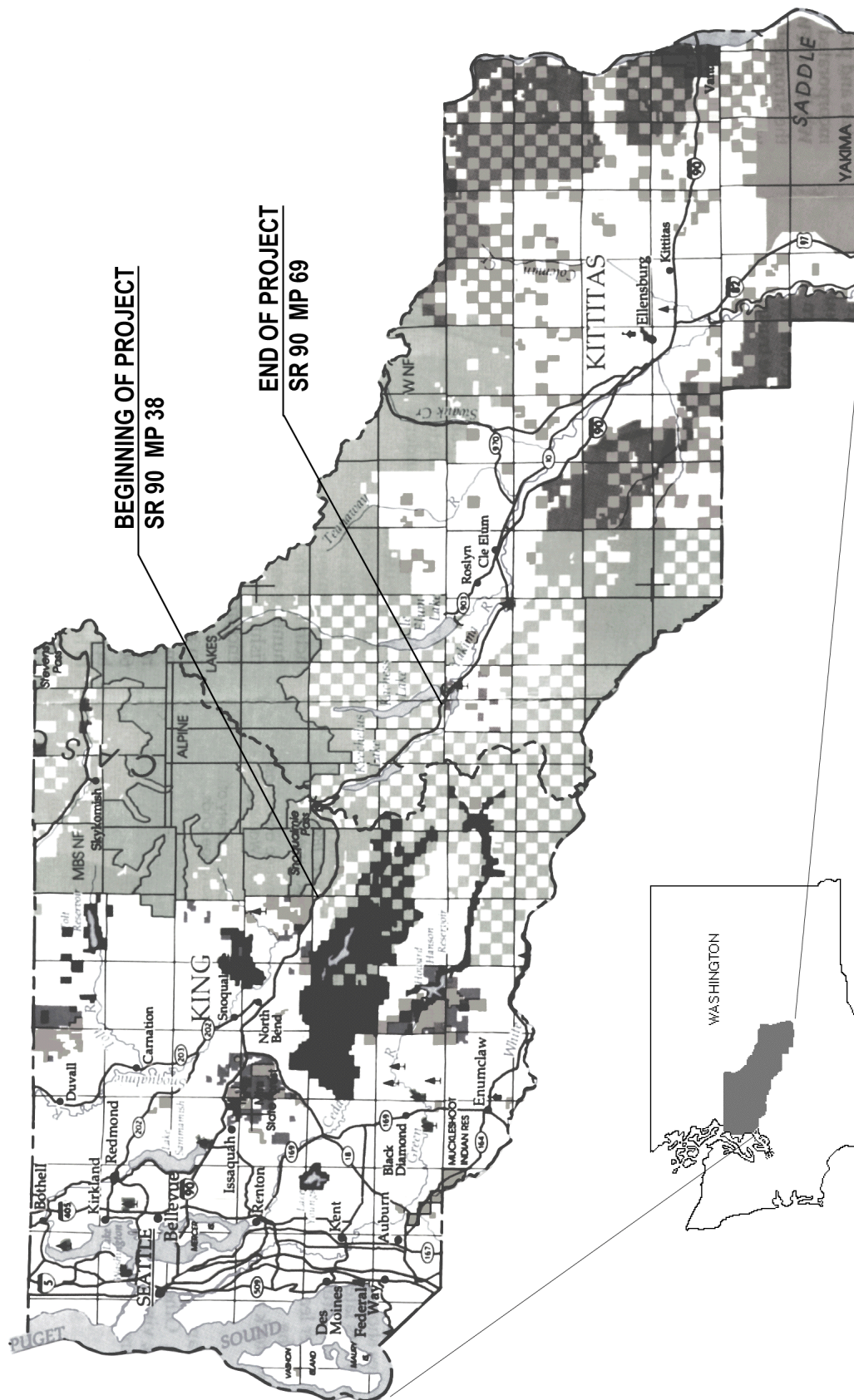
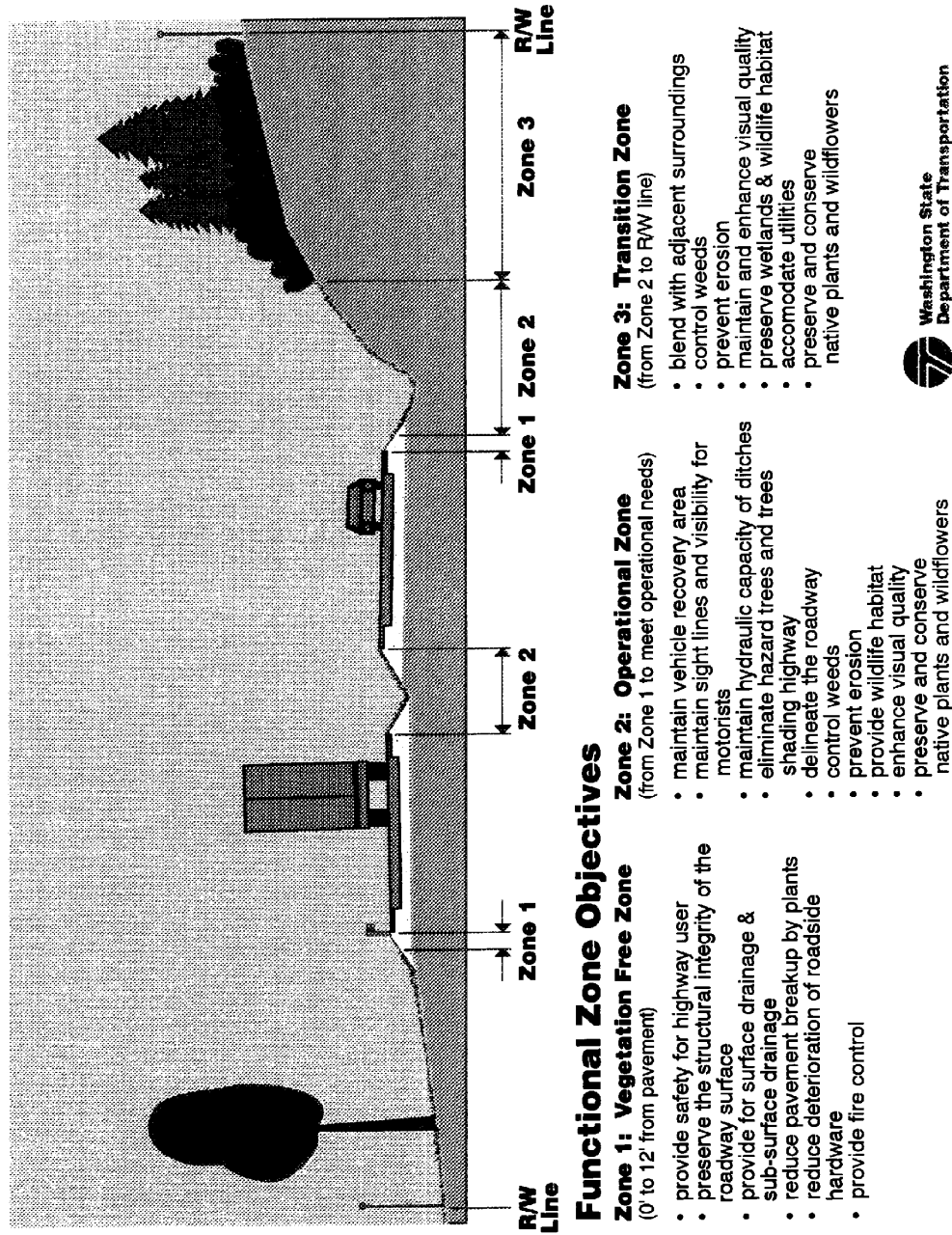


Figure 1 - Project Location Map

Figure 1 - Project Location Map

Roadside Management Zones



G9310-525

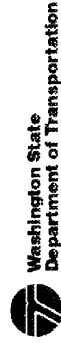


Figure 2 - Roadside Management Zones

CHAPTER 2

ALTERNATIVES INCLUDING PROPOSED ACTION

This chapter includes a discussion of the alternatives that address the purpose and need for treating noxious weeds on the Forest Service administered, WSDOT maintained, I-90 operational right of way. The alternatives developed are based on an Integrated Weed Management (IWM) approach. Each alternative comprises a unique mix of activities designed to meet the purpose and need, and addresses the issues identified during scoping.

Each alternative isolates the set of environmental effects associated with its implementation, facilitating a comparison of those effects. This comparison, along with the projected environmental effects detailed in Chapter 4, provides the Decision Official with information to make an informed choice about which alternative to implement.

This EA offers two action alternatives that meet the purpose and need for IWM. It also offers a no-action alternative.

PROPOSAL

The proposal is to create and implement an IWM program for the control of noxious weeds in the I-90 corridor. There are several goals for the program:

- 1) Use the best methods available (under the Region 6 Veg. Mgt. EIS and the Mediated Agreement) to control noxious weeds depending on their classification category, species biology, size of population, geographic location, potential for spread, other land characteristics (such as sensitive species, watershed values, health risks), and budget;
- 2) Ensure public involvement in all stages of development and implementation of an IWM plan;
- 3) Continue to inventory for new infestations of species that are targeted as highest priority for management and eradication;
- 4) Follow procedures established in this plan for site analysis of infestations including an inventory and follow up monitoring form which will document successes and failures (see Appendix K for Inventory and Monitoring Form).
- 5) Develop a process whereby the IWM program can be modified in response to changing site conditions as identified by the monitoring process.

- 6) Develop a comprehensive revegetation program to reduce the need for ongoing weed control activities.

DEVELOPMENT OF ALTERNATIVES

The following alternatives were identified and considered for further analysis. Both action alternatives fall within the provisions of the selected IWM alternative for the Region 6 Veg. Mgt. EIS and are compatible with the Forest Plan. A description of the three site types can be found on page 20 of Chapter 3.

TREATMENT STRATEGIES AND METHODS BY ALTERNATIVE					
	A: No Action	B: IWM Herbicides Excluded		C: IWM Herbicides Allowed	
Site Type	Strategy	Strategy	Methods	Strategy	Methods
Type 1	Present Practices	Prevention Early Treatment Maintenance Correction	Mechanical Manual Cultural	Prevention Early Treatment Maintenance Correction	Chemical Mechanical Cultural
Type 2	Present Practices	Prevention Early Treatment Maintenance Correction	Manual Cultural	Prevention Early Treatment Maintenance Correction	Chemical Manual Cultural
Type 3	Present Practices	Prevention Early Treatment Maintenance Correction	Manual Cultural	Prevention Early Treatment Maintenance Correction	Glyphosate Manual Mechanical Cultural

Table 1 - Treatment Strategies and Methods by Alternative

ALTERNATIVES CONSIDERED AND ANALYZED IN DETAIL

Alternatives for methods to implement strategies to control noxious weeds were developed using the control methods outlined in the Region 6 Veg. Mgt. EIS: manual, mechanical, biological chemical, prescribed fire, and competitive plantings (see Appendix F for explanation of control methods and their costs).

Alternative A - NO ACTION

Alternative A is the no-action alternative. Under this alternative no action beyond present practices would be initiated to manage noxious weeds within the project area. Under present practices the control of noxious weeds is incidental to the standard operational maintenance program. Early treatment of new invaders would continue by handpulling those spotted by maintenance crews. The established noxious weeds within the project area would not be specifically treated and there would be no coordinated prevention strategy for potential invaders. A standardized system of monitoring would not be developed and implemented.

Alternative B - IWM, HERBICIDES EXCLUDED

Alternative B is an Integrated Weed Management program that would use all control methods approved under the Region 6 Veg. Mgt. EIS except herbicides. Prevention for potential invaders would be emphasized and measures would be instituted immediately. The primary prevention strategy would be the development and implementation of a revegetation plan. Methods of control for new and established invaders will depend on the site analysis conducted for each management unit and a cost/benefit analysis.

Manual, mechanical, and biological control methods as well as competitive plantings and prescribed burning can be used to eradicate or prevent the spread of noxious weed populations. Manual control is mostly hand-pulling. It would be used to eliminate new infestations of annual species. Mechanical control is chopping or mowing plants to reduce or eliminate seed head production. Biological control utilizes insects that are natural predators of noxious weeds. Insects are not able to entirely rid an area of noxious weeds, but they may be able to help keep noxious weed populations below a damage threshold. Biological control is appropriate only for infestations that are well established or naturalized. Competitive planting involves seeding grass species in disturbed areas to form a healthy grass stand that will inhibit the establishment of noxious weed populations. Prescribed burning is the localized use of fire to burn noxious weeds. Most commonly drip torches are used to light small fires. The advantages and disadvantages of these treatments are described in Chapter VI of "A Guide to Conducting Vegetation Management Projects in the Pacific Northwest Region" (USDA, 1992).

Mitigation Measures

Alternative B would require the following mitigation measures:

- To provide consistency with the Region 6 Veg. Mgt. EIS, follow the mitigation for non-chemical treatment methods listed on Pages II-84 to II-101 of the EIS.
- Train workers to identify and protect Proposed, Endangered, Threatened, and Sensitive (PETS) plant species.
- Flag any sensitive plant population within 50 feet of the treatment site or wherever trampling or activities may pose a threat. Within this buffer noxious weeds are to be handpulled.

Alternative C - IWM, ALLOWING APPROVED HERBICIDES

The full range of treatment methods analyzed in the Region 6 Veg. Mgt. EIS would be available for use under Alternative C. An IWM program would be developed similar to Alternative B except that herbicides would be allowed as an additional control measure. Prevention would be emphasized throughout the decision making process. The primary prevention strategy would be the development and implementation of a revegetation plan. Herbicides would

primarily be used to gain initial control of noxious weed populations. As prevention strategies are implemented herbicide use would be reduced.

The herbicides that are presently available for use under the Region 6 Veg. Mgt. EIS are picloram, glyphosate, dicamba, hexazinone, and triclopyr. Any of these five herbicides may, or may not, be used within the IWM program. Product selection will be based on criteria developed during the project design phase. Herbicide information profiles for these products are included in Appendix H.

Chemicals would be applied using a variety of methods. The most effective application method for the infestation will be used. Where the noxious weeds exist in a riparian area, plants would be individually wiped by hand with the appropriate herbicide to eliminate the potential for soil or water contamination. Where infestations are localized and small, backpack sprayers with handheld nozzles would be used. This method allows for spraying only the foliage of target plants. Truck mounted sprayers may be used where backpack sprayers are determined to be impractical and not cost effective due to the size and density of the infestation. A follow up manual program would eliminate unsprayed plants and their seed production. Competitive grass plantings would be established wherever possible.

Mitigation Measures

Alternative C would require the following mitigation measures:

- To provide consistency with the Region 6 Veg. Mgt. EIS, follow pertinent mitigation measures listed on Pages II-84 to II-109 of the Region 6 Veg. Mgt. EIS and the amended Record of Decision (USDA, 1992). A copy of these mitigation measures can be found in Appendix M.
- To provide consistency with the terms of the Mediated Agreement, ensure herbicide applications follow the requirements of the Herbicide Information Profiles (Appendix H). Where herbicides cannot be applied within these restrictions, apply non-herbicide treatment methods.
- To provide consistency with Environmental Protection Agency (EPA) requirements, ensure herbicide applications follow the EPA label restrictions. Where herbicides cannot be applied within these restrictions, apply non-herbicide treatment methods.
- Generally herbicides will be mixed from concentrate on the site using appropriate safety procedures. If other mitigating factors are identified for a project site that would require other mixing procedures, these alterations will be addressed on a site specific basis to promote the highest level of safety.
- To minimize the risk of treating non-target plant species, conduct pre-treatment survey and identify target weed species (treatment areas) to

ensure that non-target species are protected and that noxious weeds are controlled.

- Herbicides would be applied directly to target plants using weed wipers and backpack or motorized sprayers with hand-held nozzles on all except the largest sites.
- Where weeds infest a desirable grass stand, selective herbicides would be used to prevent injury to the valuable competitors (for example, picloram only affects broadleaf plants).
- Each noxious weed site within the project area will be evaluated for soil type in the site description form and this information will be used to determine appropriate treatment methods.
- No herbicide application would be made when wind speed exceeds 5 miles per hour (to lessen drift) or if precipitation is expected within 24 hours.
- To minimize the risk to human health and the environment, proposed herbicides would be applied at the lowest effective rate.
- Demonstrate the efficacy of herbicide applications in reducing weed densities as well as reduction in total herbicide usage over time.
- Train workers to identify and protect Proposed, Endangered, Threatened, and Sensitive (PETS) plant species.
- Establish a minimum 50 foot no-herbicide buffer around all sensitive plant populations. Within this buffer noxious weeds are to be handpulled.
- To minimize risk to water resources, Picloram would not be used within 100 feet of streams, rivers, lakes, wetlands, or ditches with standing water. Glyphosate and Triclopyr may be used within a 10-50 foot distance from water if site conditions (slope, soil characteristics) indicate that the risk of off-site movement is low and then individual plants must be hand-wiped with this herbicide. At 0-10 feet from water or ephemeral channels, weeds will be handpulled or treated with wiper applied glyphosate (aquatic formulation only).
- Public announcement of proposed herbicide applications would be published in the local newspapers one month in advance of application.

Items Common to Alternatives B and C

The following items are common to the two action alternatives. These items are components of the proposed IWM program that will be designed if the decision is made to proceed with the project.

Noxious Weed Categories

There are 3 noxious weed categories used by the Forest Service: potential, new, and established. For the purposes of this project potential invaders are those species which have not been identified within the project area but invasion is imminent. New invaders are species that are in the early stages of invasion and have not yet spread to the point that resource damage is occurring, but potential for damage is high. Established infestations are species that have spread to the point that they have naturalized and are causing an unacceptable level of resource damage. Noxious weeds within the project area are classified as follows:

CLASSIFICATION OF NOXIOUS WEEDS WITHIN I-90 PROJECT AREA		
Potential Invaders	New Invaders	Established Species
Kochia	Perennial pepperweed Scotch Broom Orange hawkweed Leafy spurge Purple Loosestrife Meadow Knapweed Blueweed	Tansy Ragwort Canada Thistle Diffuse Knapweed Spotted Knapweed Oxeye daisy Dalmation toadflax

Table 2 - Classification of Noxious Weeds Within Project Area

As a major transportation corridor, the project area has a virtually unlimited source of potential invaders. For example, within the last three years orange hawkweed has invaded the site and is believed to have been transported from Montana. In addition, some species of new invaders and established species maintain localized populations and would be considered potential invaders on other parts of the project area.

Damage Thresholds

The Region 6 Veg. Mgt. EIS directs the forest to determine damage thresholds and strategies for managing noxious weed invasions. Damage thresholds, the point at which damage to the environment will initiate active management, have been indirectly set in the FSM (2083.1) and the EIS, which direct infestation prevention, containment, and suppression.

For potential invaders, there is no threshold to initiate activity; prevention as a strategy for management (see Appendix L for Prevention Strategies) must be used. For new invasions where eradication is possible, the action threshold is any detected infestation and the strategy is early treatment. The preferred strategies for established infestations will be correction of high population levels and maintenance of low population levels.

Management Units

The project area is approximately 160 acres in size, varying site characteristics will be used to break-down the project area into smaller

management units to properly apply the 5-step process (site analysis, select strategy, design project, action, and monitor) detailed in the mediated agreement. Management units will be created by grouping together areas of the same site type (as described in Chapter 3) that have similar noxious weed populations and site characteristics. Management units will be designated by number and an inventory and monitoring form will be filled out for each unit. Management strategies will be developed for each management unit to ensure that the proper control methods are applied to address the unique conditions of each unit type.

Worker Safety

As a part of the implementation of the IWM program, the WSDOT will follow all measures as detailed in A Guide to Conducting Vegetation Management Projects in the Pacific Northwest (Chapter 3, USDA, 1992) for worker protection and health reporting . This includes providing information to workers about health effects, reducing worker exposure to herbicides by wearing protective clothing, excluding hypersensitive employees, and reporting human health effects caused during vegetation management projects.

Prevention Strategies

Prevention strategies are common to both Alternatives B and C. Prevention means to detect and correct the conditions that cause or favor the presence of competing or unwanted vegetation.

Implementing prevention strategies on the project site requires analyzing the risk of noxious weed invasion during the project planning process and developing tactics, wherever possible, to avoid introduction or spread of specific noxious weeds before land management decisions are made and actions taken.

The primary prevention strategy to be implemented is the revegetation of bare ground areas wherever practical and appropriate. A revegetation plan will be developed for the project area and reviewed by the Forest Service.

A list of additional prevention strategies which comply with direction in the USDA Forest Service Manual and the Region 6 Veg. Mgt. EIS are listed in Appendix L.

Monitoring Plan

Monitoring is the fifth step of the IWM process. Monitoring requirements are outlined in the interim direction to the Region 6 Veg. Mgt. EIS which is documented in a July 21, 1989 letter, file designation 2150, entitled "Vegetation Management Record of Decision - Interim Directions." Copies of monitoring forms to be completed for each management unit can found in Appendix K.

ALTERNATIVES CONSIDERED AND NOT ANALYZED IN DETAIL

An alternative considering the use of the herbicide 2,4-D was not analyzed in detail. In the Record of Decision for the Region 6 Veg. Mgt. EIS (page 6), 2,4-D is identified as a tool to be selected as a last resort. Effective treatments aside from 2,4-D are available for all of the project area site types addressed by the proposed IWM program.

Alternatives which considered the aerial application of herbicides were not analyzed in detail. Prevention strategies, treatments other than herbicides, and herbicide application using species-specific treatments were considered sufficient to bring the project area addressed by the IWM program under an effective control strategy.

Alternatives which considered the use of prescribed burning were not analyzed in detail. The WSDOT does not consider this a desirable method of weed control due to concerns about efficacy and highway safety. Experience in roadside situations where noxious weeds and grasses are present has shown that broadleaf weeds tend to emerge more quickly than grasses after a burn thus gaining a competitive advantage. Safety concerns include the potential for smoke obscuring visibility.

COMPARISON OF ALTERNATIVES BY AFFECTED RESOURCE

The affected resources identified in Chapter 3 are indicators that relate directly to the significant issues described in Chapter 1. Table 3 compares the three alternatives by their effect on these resources.

COMPARISON OF ALTERNATIVES BY AFFECTED RESOURCE

AFFECTED RESOURCE	ALTERNATIVE		
	A	B	C
Vegetation	Continued displacement of native vegetation by dominant noxious weed species.	Heavy equipment use could compact soils and remove vegetative cover. Repeated mowing could weaken less competitive desirable species.	Desirable vegetation would be reestablished and aggressive weeds would be controlled within the project area.
Range Lands (Off-Site)	Productivity would decrease as noxious weeds continue to spread to adjacent range lands and displace desirable forage species. Land values would decline. Land management costs would increase.	Similar to Alternative A if noxious weed populations are not eliminated within the project area.	The threat of noxious weed spread from the project site to adjacent range lands would be significantly reduced.
Farm Lands (Off-Site)	Productivity would decrease and weed management costs would increase as noxious weeds spread from the project site to adjacent farm lands.	Similar to Alternative A if noxious weed populations are not eliminated within the project area.	The threat of noxious weed spread from the project site to adjacent farm lands would be significantly reduced.
Forest Lands (Off-Site)	Biodiversity would be threatened by the spread of noxious weed species from the project site.	Similar to Alternative A if noxious weed populations are not eliminated within the project area.	The threat of noxious weed spread from the project site to adjacent forest lands would be significantly reduced.
WSDOT Right of Way (Off-Site)	Cost of noxious weed management program would continue to increase throughout the I-90 corridor as weeds spread along the roadside.	Similar to Alternative A if noxious weed populations are not eliminated within the project area.	The threat of noxious weed spread throughout the operational right of way would be significantly reduced.
Noxious Weeds	Noxious weeds would not be impacted under this alternative.	Noxious weed populations would be reduced, but not eliminated under this alternative	Noxious weed populations within the project area would be reduced to a level below the established damage threshold.
Off-Target Plants	There would be no herbicide damage to off-target plants.	Mechanical damage to off-target plants is expected. There would be no herbicide damage to off-target plants.	Some off-target damage is expected.
PETS Plants	Purple loosestrife would out-compete the three PETS plants found within the project area	There would be no impact to the three PETS plants found within the project area as purple loosestrife would easily be controlled.	There would be no impact to the three PETS plants found within the project area as purple loosestrife would easily be controlled.

Table 3 - Comparison of Alternatives by Affected Resource

COMPARISON OF ALTERNATIVES BY AFFECTED RESOURCE

AFFECTED RESOURCE	ALTERNATIVE		
	A	B	C
Soils	Increasing erosion as noxious weeds with lesser soil holding characteristics displace erosion control grasses.	Heavy equipment use could compact soils. Increased erosion due to soil disruption.	Reduced erosion and increased productivity due to elimination of noxious weeds and the successful establishment of desirable grass species.
Groundwater	There would be no impact to groundwater under this alternative.	There would be no impact to groundwater under this alternative.	Potential for short term impacts to groundwater. Potential will decrease over time after initial control is complete and prevention strategies are emphasized.
Surface Waters	Some increased siltation from erosion runoff expected as erosion control grasses are displaced by noxious weeds.	Increased siltation expected due to increased erosion from mechanical soil disruption.	Potential for short term contamination of surface water. Potential will decrease over time after initial control is complete and prevention strategies are emphasized.
Human Health	No direct impact on human health.	Increased potential for worker injury due to increased activity on the project site.	Slight risk to workers and public during initial control phase. Risks decrease over time as prevention strategies become emphasized.
Fish and Wildlife	Continued loss of habitat is expected as noxious weeds out-compete native species.	Similar to Alternative A if noxious weeds are not controlled.	Slight risk of chemical exposure decreasing over time. Expected improvement in wildlife habitat within the project area.
PETS Wildlife	Potential for indirect off-site impacts to PETS wildlife due to habitat damage.	Similar to Alternative A if noxious weeds are not controlled.	Slight risk of chemical exposure decreasing over time. Expected improvement in wildlife habitat within the project area.
WSDOT Maintenance Program	Program costs grow slightly over time in order to control weed spread on adjacent right of way.	Maintenance program costs would be considerably higher than the existing program.	Costs would increase for the first few years and then decrease to level similar to the present program.
Forest Plan Consistency	Not consistent with the goals and objectives of the Forest Plan as amended by the ROD.	May achieve consistency with the amended Forest Plan if noxious weed control is successful.	Consistent with the goals and objectives of the Forest Plan as amended by the ROD.

Table 3 - Comparison of Alternatives by Affected Resource (continued)

CHAPTER 3

AFFECTED ENVIRONMENT

This chapter describes the existing environment of the project area, providing a baseline from which effects on the environment can be measured. This chapter is organized into the following two discussions:

- Unique conditions and similarities among the physical characteristics of various portions of the project area are described, and the rationale behind classifying them into specific management site types is presented.
- The existing environment of areas potentially affected by the proposal is described under five resource headings. These same resource headings will be used in Chapter 4 where the potential effects of the alternatives on the environment are discussed.

SITE TYPES

Three site types which have the potential to harbor noxious weeds have been identified within the I-90 operational corridor. Each site type has a unique combination of site characteristics which will influence the choice of noxious weed control methods. These three site types fall within the WSDOT Roadside Management Zones 1 and 2 (see Chapter 1, Figure 2).

- Type 1: Roadway median areas, interchange quadrants, and roadsides. Disturbed areas within the highway operational right of way. Cut and fill areas with variable soil characteristics. Type 3 sites are generally vegetated with erosion control grasses and kept free of large trees and shrubs to promote sight distance, errant vehicle recovery, and safety. WSDOT designation is Zones 1 and 2.
- Type 2: Steeply sloped cut or fill areas where mechanical access is limited. Vegetative cover is poor due to lack of topsoil, rocky conditions, and/or winter sand build-up. WSDOT designation is Zone 2.
- Type 3: Riparian areas within 100 of feet streams, rivers, lakes, and ditches with standing water. Vegetative cover varies from that which is similar to site types 1 and 2 to dense communities of native plants. WSDOT designation is Zone 2.

RESOURCE DESCRIPTIONS

Vegetation

The section of the I-90 corridor that includes the proposed project site passes through several general forest series; western hemlock and pacific silver fir west of Snoqualmie Pass and douglas fir, western hemlock, and grand fir east of the Pass.

Type 1 sites exhibit limited vegetative diversity due to maintenance practices designed to promote safety for the traveling public. These areas received erosion control grass seed after highway construction and have been maintained to discourage the growth of trees and brush. Noxious weeds are now becoming the dominant plant type in type 1 sites. Some areas, particularly on the west side of Snoqualmie Pass, have been allowed to revegetate and now show a wide variety of trees, shrubs, and groundcovers reflecting the vegetation prevalent on the surrounding forest lands.

Type 2 sites exhibit many of the same characteristics as type 1 sites. Type 2 sites, due to the steepness of the slopes are not regularly mowed; consequently pioneer species such as alder and cottonwood are allowed to grow for several years before mechanical brushing is performed.

Type 3 site vegetation is composed of typical riparian dependent plants. Species and structural diversity is high.

PETS Plant Species

There are 34 Proposed, Endangered, Threatened, and Sensitive (PETS) plant species known or suspected to occur within the North Bend Ranger District and 52 PETS plants known or suspected to occur within the Wenatchee National Forest. The biological evaluation for plants within the project area is located in Appendix E . Of those PETS plants three are known to occur in or near the project area (Table 4). Mitigation is specified in the biological evaluation and will be implemented by the WSDOT.

PETS PLANTS WITHIN THE PROPOSED PROJECT AREA	
Scientific Name	
Gentiana douglasiana	
Carex buxbaumii	
Carex pauciflora	

Table 4 - PETS Plants within Proposed Project Area

Noxious Weeds

In 1992 a noxious weed survey of the I-90 corridor was prepared for WSDOT right of way between mile posts 38 and 69 (see Appendix A). The survey was conducted through a cooperative effort between WSDOT, the Washington State Department of Agriculture, the USDA Forest Service, and the Washington State Noxious Weed Control Board. The survey found the entire area infested with large communities of Spotted,

Diffuse, and Meadow knapweeds; and Oxeye daisy. There were multiple young communities of Perennial pepperweed, Orange hawkweed, and Leafy Spurge. Dalmation toadflax was found to be common on east side of the Pass, and Scotch broom and Tansy ragwort were found in places on the west side. In September of 1994 purple loosestrife was identified on the project site at MP 53.9 eastbound.

Human Environment

The I-90 corridor serves as the primary east-west transportation link in the state of Washington for commerce and recreation. The primary reason for people to leave the highway within the project area is to reach recreational destinations, such as ski resorts, trail heads, hunting and fishing areas, campgrounds, and sight-seeing opportunities. The Snoqualmie pass recreation area is the main center of human activity within this section of the I-90 corridor.

The actual project area, as identified by the site type descriptions, is not intended for public use. Paved roadway shoulders and pullouts are provided for disabled vehicles and viewing opportunities. No recreational destinations or residences are accessed directly from the highway.

Fish and Wildlife

The I-90 corridor passes by or through a variety of habitats, including riparian areas, lakes, reservoirs, rivers, forests, and rock outcrops. It is Forest Service policy to protect the habitat of federally listed threatened and endangered species, and Forest Service sensitive species from adverse modification or destruction, as well as to protect individual organisms from harm or harassment as appropriate (FSM 2670.3).

The Mt. Baker-Snoqualmie and Wenatchee National Forests contain many species of wildlife. Few of these species rely exclusively on habitat provided by the areas immediately adjacent to the I-90 roadway and none are known to depend on habitat provided by the noxious weed populations discussed in this EA. However, many species live in areas adjacent to the highway corridor and may occasionally use roadside habitat. Riparian areas provide habitat for an abundance of species, and many species are uniquely dependent on riparian habitat associations.

Endangered, Threatened, and Sensitive Fish and Wildlife Species

There are 25 Proposed, Endangered, Threatened, and Sensitive (PETS) fish and wildlife species that are found or suspected to occur on the Mt. Baker-Snoqualmie and Wenatchee National Forests (see Table 5).

PETS FISH AND WILDLIFE SPECIES ON THE MT. BAKER-SNOQUALMIE AND WENATCHEE NATIONAL FORESTS	
COMMON NAME	SCIENTIFIC NAME
State/Federal Proposed and Listed Species	
Northern spotted owl	<i>Strix occidentalis</i>
Marbled murrelet	<i>Brachyramphus marmoatus</i>
Grey wolf	<i>Canis lupus</i>
Grizzly bear	<i>Ursus arctos h.</i>
Peregrine falcon	<i>Falco peregrinus a.</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Cascade frog	<i>Rana cascadae</i>
Northern red-legged frog	<i>Rana aurora aurora</i>
Northwestern pond turtle	<i>Clemmys marmorata marmorata</i>
Northern goshawk	<i>Accipiter gentilis</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Three-toed woodpecker	<i>Picoides tridactylus</i>
Black-backed woodpecker	<i>Picoides arcticus</i>
Spotted bat	
Townsend's big-eared bat	<i>Plecotus townsendii t.</i>
Flammulated owl	<i>Otus flammeolus</i>
Fisher	<i>Martes pennanti</i>
Marten	<i>Martes americana</i>
California wolverine	<i>Gulo gulo</i>
Common loon	<i>Gavia immer</i>
Bull trout	<i>Salvelinus confluentus</i>
Red band trout	<i>Onchorynchus mykiss</i>
Northern American lynx	<i>Felis lynx canadensis</i>
Larch mountain salamander	<i>Plethodon larselli</i>

Table 5 - PETS Fish and Wildlife Species

The Biological Evaluation process was performed for the 25 PETS species (see Appendix D). For an explanation of this process, refer to Appendix A in the USFS district files. Habitat requirement information, used to evaluate the potential for effects on each PETS species, can be found in Appendix F (for wildlife species) of the project file.

A Pre-Field Review was completed and it was determined that Field Reconnaissance was necessary only for bull trout and red band trout. The project area does not contain any suitable habitat for any of the other listed species. No critical habitat for spotted owl or proposed critical habitat for marbled murrelet exists within the I-90 right of way.

Within the project area bull trout are found in Gold Creek, a tributary to Keechelus Lake, and in Keechelus. This population is believed to consist of fewer than 50 mature individuals and is vulnerable to disturbance. Red

band trout, a variant of rainbow trout that have been found east of the Cascades in the Columbia River basin, are suspected to occur throughout the Wenatchee National Forest where wild rainbow trout populations exist.

Soil and Water Quality

Soil types vary throughout the project area. Virtually all soils within the project area have been disturbed, modified, imported, and /or compacted during the construction of the highway.

There are numerous bodies of water in the vicinity of the project area. The largest of the water bodies that either pass through the project or are on the project margin are the South Fork of the Snoqualmie River and Lake Keechelus. Several creeks are conveyed under the highway through culverts. There 10 major creek or river crossings within the project area west of Snoqualmie Pass and 16 crossings east of the pass. Major creeks/ rivers crossed include:

West

Mason Creek
Talapus Creek
South Fork Snoqualmie River
Humpback Creek
Olallie Creek
Denny Creek

East

Coal Creek
Gold Creek
Rocky Run Creek
Wolfe Creek
Resort Creek
Price Creek
Noble Creek
Toll Creek
Cedar Creek
Telephone Creek

There is a wetland in the vicinity of Snoqualmie Pass. The water source for this wetland is ground water and runoff from adjacent lands.

Economic Values

The primary sources of economic value that are linked to the project area are those associated with adjacent land uses and resources. Recreational opportunities and timber resources provide the bulk of the economic value to adjacent forest lands. Further out from the project area residential, commercial, and agricultural development are the primary sources of economic value. Agricultural land uses include farming and livestock production. Associated with livestock production is the maintenance and management of range lands, particularly on the eastern side of the State.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

This chapter presents the scientific and analytical basis for the comparison of the alternatives displayed in Chapter 2. The probable consequences of implementing each alternative are disclosed for the resource affected. The discussion is organized by alternative, and the same resource areas described in Chapter 3 are analyzed here. Consequences are described in the context of direct, indirect, and cumulative effects.

ALTERNATIVE A - No Action

Under this alternative an IWM program would not be implemented. This alternative would not comply with Forest Plan standards and guidelines and State and Federal laws and policies in regard to the control of noxious weeds. The Mt. Baker/Snoqualmie and Wenatchee National Forests would not tier to the Region 6 Veg. Mgt. EIS. Prevention strategies would not be applied systematically and treatment practices would not be conducted.

Project objectives of pursuing prevention and control of identified noxious weeds and promoting the long-term health and productivity of the forest ecosystems would not be met. The no-action alternative also conflicts with State and Federal laws and Departmental policy regarding noxious weeds [(1990 Farm Bill amendment to the 1974 Noxious Weed Act (36 CFR 222.8b), USDA FSM (sections 2080-2082)], and the Forest Plan.

Vegetation

Changes to vegetation would differ between site types. All types would experience continuing increases in noxious weeds which outcompete other plant species, virtually eliminating biodiversity within the project area. The failure to implement prevention and early treatment strategies would likely lead to the introduction of new species of noxious weeds which could potentially be transported to other areas of the state. The spread of noxious weeds to adjacent forest lands has the potential to devastate fragile ecosystems particularly if alpine meadow lands become infested. Purple loosestrife has the greatest potential to destroy aquatic ecosystems within the project area as it has already done to wetland areas throughout the state.

PETS Plant Species

The failure to implement a control strategy for purple loosestrife would certainly lead to the demise of the three PETS plant species listed in Chapter 3. The three listed species inhabit a wetland environment in which purple loosestrife is known to outcompete all other species.

Noxious Weeds

There would be no effect on the natural growth of noxious weed populations under this alternative. Noxious weed populations would expand at an exponential rate as these species continue to out-compete grasses and native vegetation.

Human Environment

Visual quality and human health would not be adversely impacted by the implementation of the no-action alternative.

The visual quality of the existing roadside environment would remain unchanged with the exception of increased populations of noxious weeds. The reaction of the general public to the increase in noxious weed populations is governed by their knowledge of the issues.

Because no treatment activities would occur that could potentially impact human populations directly, effects on human health would remain unchanged. There would be no risk to worker health from herbicides.

Fish and Wildlife

The increase in tansy ragwort populations will have a direct effect on large mammals. This noxious weed is toxic to large mammals and is known to cause irreversible liver damage in cattle and horses.

The failure to control noxious weed spread will lead to a decrease in the amount of forage grasses available to wildlife both within and outside of the project area. This may affect the foraging patterns of small and large mammals. Overall, wildlife habitat will be degraded.

Purple loosestrife is known to outcompete all other riparian plant species and creates a monoculture that provides no useful habitat for fish and wildlife species.

Endangered, Threatened, and Sensitive Fish and Wildlife Species

While no PETS wildlife are known to occur within the project area, the indirect effects from off-site spread into suitable PETS species habitat would be similar to those described above.

Untreated weed infestations could deteriorate PETS riparian habitat by decreasing herbaceous vegetation which provides foraging habitat for PETS species or their prey.

There would be no impact to bull or red band trout populations.

Soil and Water Quality

Because no treatment of noxious weeds would occur, there would be no potential risk of contaminating soil and water resources with herbicides. With no treatment of weed infestations, an increase in erosion and sedimentation of water may occur indirectly by the displacement of native vegetation by noxious weed

species. Knapweeds, for example, are poor protectors of soil and water resources (Lacey et al. 1989)

Economic Values

There would be no direct economic effects on commercial operations related to the no-action alternative. However, there would be lost opportunity costs from weed infestations remaining untreated and spreading to adjacent lands. These lost opportunity costs would be born by the local economies and would include reduced benefits from hunting due to a reduction of big game forage, increased pressure on privately owned forage resources, and increased noxious weed control costs to private and public lands.

Because no additional weed management operations would be initiated, there would be no increase in the cost of highway maintenance. However, because the proposed project area would continue to function as a seed source the cost of weed control activities on adjacent state owned right of way would continue to be higher than it would be if the seed source were eliminated. These lost opportunity costs would continue to divert resources from other essential maintenance projects.

ALTERNATIVE B - IWM Program, Herbicides Excluded

Under Alternative B the WSDOT would develop an IWM program that provides for the use of all treatments approved in the Region 6 Veg. Mgt. EIS except for herbicides. The IWM program would tier to the Region 6 Veg. Mgt. EIS. This alternative is similar to existing noxious weed management practices except that prevention strategies would be emphasized throughout the decision making process and a standardized system of monitoring/record keeping would be utilized.

Effects of treatment methods on all parts of the natural environment are analyzed in Chapter 4 of the Region 6 Veg. Mgt. EIS (USDA 1988).

Vegetation

Roadside vegetation would move towards the desired future condition where all priority noxious weeds would be brought under a treatment strategy. Knapweed populations may continue to expand as the one of the most important elements of an effective program for knapweed control (herbicides) would be excluded from the program (Roche 1991).

In all site types, the infestations that are not effectively controlled without herbicides would continue to compete with desirable vegetation. The failure to adequately control knapweed populations on all site types would pose a continuing threat to vegetative diversity on adjacent lands as described in Alternative A. The implementation of prevention strategies would mitigate some impacts.

In order to achieve effective control of noxious weeds under this alternative a high degree of mechanical and human activity within the project would be

necessary. This increased activity may include increased mowings, use of weed-eaters, tilling, and hand pulling. There is the potential for this increase in activity to disturb and inhibit the growth of desirable vegetation.

PETS Plant Species

Because the primary threat to the three listed PETS plant species, purple loosestrife, is in the very early stages of invasion and control can be achieved within the limits outlined by the mitigation measures described in the biological evaluation for plants (Appendix E), there would be no negative impacts to these species.

Noxious Weeds

Noxious weed populations may be reduced and controlled under this alternative. Should non-chemical treatment methods fail to reduce and control populations, thus rendering prevention strategies inconsequential, the further expansion of noxious weed populations is assured.

Human Environment

Because herbicides would not be available as a treatment method, there would be no risk to human health and the environment from the use of herbicides. Some degree of risk to worker health is inherent to all treatment methods and would be present in all site types within the project area. In general, these risks are associated with working in a natural environment where environmental conditions pose certain risks, working in a roadside setting, and working with equipment. Risks to public health are commensurate with the accessibility of the site. Much of the project area is accessible by vehicle and by foot from vehicles on the roadway shoulder. Even though sites within the proposed project area are not intended for public access, with the exception of shoulder areas, there is the potential for the general public to come into contact with treatment activities.

If the general public considers the presence of noxious weeds to be a negative impact on visual quality then any significant reduction in weed populations is considered a beneficial affect. This benefit may be offset by increased presence of noxious weed management activities on the roadside.

Fish and Wildlife

An analysis of manual, mechanical, biological, and revegetation treatment methods on fish and wildlife species can be found in Chapter 4 of the Region 6 Veg. Mgt. EIS (pg. IV-82 to IV-92, IV-98 to IV-99; USDA 1988) and in Chapter VI of A Guide to Conducting Vegetation Management Projects in the Pacific Northwest Region (USDA 1992).

Noxious weeds that persist despite the use of these treatment methods could effect wildlife in a similar manner to Alternative A. Weed populations that are reduced or eradicated by these methods could beneficially affect wildlife, for example, by allowing the quality of forage to increase.

The increase in noxious weed management activities may create a disruption in the normal activity patterns of wildlife which frequent the roadside environment

Endangered, Threatened, and Sensitive Fish and Wildlife Species

Suitable habitat for the PETS wildlife species listed in Chapter 3 does not exist within the project area. There would be no direct effect to PETS wildlife species from the control methods available under this alternative. Indirect effects to PETS species by the failure to control off-site spread of noxious weeds would be similar to Alternative A. All activities will occur within the ambient noise level of the I-90 corridor.

There would be no impact to bull or red band trout populations provided that mitigation measures are implemented.

Soil and Water Quality

There would be no potential risk of chemically contaminating soil and water resources because no herbicides would be used. The handpulling of plants would cause minimal, short-term disturbance of soil and undetectable impacts to water quality. The addition of biological control agents would not affect soil and water resources.

Non-herbicide treatments will control some of the weed infestations. For these specific sites, soil productivity, cover, and soil holding capabilities would improve as beneficial vegetation replaces noxious weeds. Where non-herbicide treatments do not completely control weeds, the effects of implementing Alternative B would be similar to those described for Alternative A except that revegetation of treatment sites could mitigate some impacts.

Economic Values

The implementation of Alternative B would have no direct negative impact on commercial operations. Should the control methods available under this alternative prove to be ineffective on some weed populations, the subsequent spread of weeds could lead to lost opportunity costs for commercial operations and other private landowners.

Weed populations that are controlled or eradicated by the implementation of this alternative would benefit adjacent private and public landowners by reducing the spread of noxious weeds and their associated lost opportunity costs.

The implementation of this alternative would have a direct impact on the cost of management activities within the project area. The initiation of prevention strategies and an active program to control noxious weeds would be an addition roadside management system.

Of the noxious weeds known to occur within the project area the three knapweeds species are considered the most difficult to control without the use of herbicides. Recent studies published by the Washington Interagency Knapweed Committee (see Appendix I) show that dense populations of knapweed can be effectively controlled by hand pulling. The study shows that with three pullings per year knapweed populations were reduced 97% after 5 years. At an average cost of \$115 per acre (see Appendix F), the cost of achieving these results within

the project area would be \$276,000. This addition to the system could lead to lost opportunity costs if the budget for roadside management activities remains unchanged.

ALTERNATIVE C

Alternative C is the same as Alternative B except that herbicides would be included as a direct treatment method. The advantages and disadvantages of herbicide treatments are discussed in Chapter VI of A Guide to Conducting Vegetation Management Projects in the Pacific Northwest Region (USDA 1992). Herbicides available for use in the IWM program are picloram, glyphosate, hexazinone, dicamba, and triclopyr. Herbicide Information Profiles for these herbicides are provided in Appendix H.

Effects of treatment methods, including herbicides, on all parts of the natural environment are analyzed in Chapter 4 of the Region 6 Veg. Mgt. EIS (USDA 1988).

Vegetation

The impacts on vegetation for the non-chemical treatment strategies are similar to those found for Alternative B. It is anticipated that there would be less reliance on mechanical and manual control methods under this alternative and that there would be fewer adverse impacts to vegetation associated with their use.

The use of selective herbicides to control broadleaf annual and perennial noxious weeds without damaging desirable grasses would be an achievable and significant benefit and would be consistent with the goals and objectives for roadside vegetation. The reduction and elimination of noxious weed populations within the project area would benefit native vegetation on adjacent lands by eliminating the seed source for these aggressive competitors, thus reducing the threat of their spread and preserving biodiversity. Further from the project site, fragile forest ecosystems and agricultural and range land vegetation would benefit from the elimination of this seed source by the real reduction in noxious weed invasion, establishment, and spread.

Because the past goals and objectives of highway management have precluded the establishment of native plant communities throughout much of the project area, the potential for off target herbicide damage would be minimal provided that the prescribed mitigation measures are implemented.

The effective control of noxious weeds afforded by the implementation of Alternative C would ensure a successful noxious weed prevention program. This prevention program would encourage the establishment of native plant communities, where appropriate, and further improve biodiversity within the highway right of way.

PETS Plant Species

Because the primary threat to the three listed PETS plant species, purple loosestrife, is in the very early stages of invasion and control can be achieved within the limits outlined by the mitigation measures described in the biological evaluation for plants (Appendix E), there would be no negative impacts to these species.

Noxious Weeds

Noxious weed populations would be brought under control under this alternative because the most effective control tool, herbicides, would be utilized in concert with all other control methods.

Human Environment

Alternative C has the potential to improve visual quality by eradicating noxious weed infestations which some people may find objectionable. The control of noxious weeds and the establishment of stable, desirable, plant communities would be a benefit to visual quality.

Risks to human health under this alternative are similar to those under Alternative B with the exception of the introduction of herbicides into the IWM program. There are no unusual conditions that indicate this alternative would cause greater effects on worker and public health than that disclosed in Chapter IV of the Region 6 Veg. Mgt. EIS and the Herbicide Information Profiles. Mitigation measures that reflect the herbicide application precautions and restrictions required by this proposed plan and in the Region 6 Veg. Mgt. EIS are listed in Chapter 2 of this document.

Fish and Wildlife

The effects of non-herbicide treatment methods on fish and wildlife are discussed under Alternative B.

Herbicides have the potential to directly affect wildlife species by immediate contact, inhalation, ingestion, and loss of food sources. Appendix J of the Region 6 Veg. Mgt. EIS discusses the effects of different herbicides on wildlife species.

Picloram, glyphosate, triclopyr, dicamba, hexazinone and their formulations have not been tested for chronic or acute toxicity to wildlife species. Tests on laboratory birds and animals found no significant direct effects. The Region 6 Veg. Mgt. EIS states that although studies are limited and must be extrapolated from tests for laboratory animals to wildlife species, the herbicides considered in that analysis are unlikely to have effects on wildlife populations.

HERBICIDE	RELATIVE TOXICITY		
	FISH	BIRDS	MAMMALS
Glyphosate	Slightly Toxic	Practically Non-Toxic	Practically Non-Toxic
Triclopyr	Slightly Toxic	Slightly Toxic	Slightly Toxic
Picloram	Moderately Toxic to Slightly Toxic	Practically Non-Toxic	Slightly Toxic to Practically Non-Toxic
Dicamba	Slightly Toxic	Practically Non-Toxic	Slightly Toxic
Hexazinone	Practically Non-Toxic	Practically Non-Toxic	Slightly Toxic

Table 6 - Relative Toxicity of Proposed Herbicides

Little is known of the effects of these herbicides on amphibians. Mitigation measures for the IWM program should prevent any adverse impacts to amphibian populations though individuals may be accidentally affected.

Alternative C would allow the effective control of all known noxious weed species within the project area. The indirect effects to wildlife species and habitat described for Alternative A would not occur. Wildlife habitat diversity could be enhanced by the reduction of weed populations.

Direct cumulative effects to wildlife and amphibian species and indirect cumulative effects to the food chain are not different than those already discussed in Chapter IV of the Region 6 Veg. Mgt. EIS (pp. 82-97). Herbicide use is intended to be a minor part of the IWM program.

Endangered, Threatened, and Sensitive Fish and Wildlife Species

The Biological Evaluation for PETS wildlife species determined that the habitat surrounding the project area does not contain any suitable habitat for any of the 14 listed species. In addition, no critical habitat for spotted owl or proposed critical habitat for marbled murrelet exists within the I-90 corridor. A list of these PETS species can be found in Chapter 3 of this document.

No long term effects to any PETS animal species will occur with this project. All activities will occur within the ambient noise level of the I-90 corridor. It is possible that there may be some short term effects in the nature of avoidance of the project area during project activity by some of the large ranging animals. However, the size of the area is small and the duration of spraying will not preclude use by animals crossing the interstate, thereby limiting any effects. The risk of adverse effects from project activities, including related activities and/or cumulative effects, was evaluated and a determination of "no effect" for all 14 PETS fish and wildlife species was made.

There would be no impact to bull or red band trout populations provided that mitigation measures are implemented.

Soil and Water Quality

The potential effects of non-herbicide noxious weed treatments on soil and water quality are the same as those identified for Alternative B.

Soil productivity may be lost from the residual effect of picloram and triclopyr. Future weed treatment projects proposing the application of picloram and triclopyr would need to consider the potential effect on soil productivity.

The use of herbicides on riparian type sites are of heightened concern. The herbicides and potential effects on water quality are described below.

Glyphosate

Glyphosate is highly soluble in water (Worthington and Walker, 1983). Glyphosate strongly adsorbs onto soil particles and thus is usually described as having a low potential for leaching (Worthington and Walker, 1983; Cox, 1991)

Glyphosate, applied either by hand wiping (<50 ft. from streams) or with a backpack sprayer (>50 ft. from streams) to individual plants, is not likely to drift toward or leach through soils to streams. No adverse effect on water quality is expected as a result of treating suitable sites with glyphosate when applying the chemical in accordance with EPA requirements identified on the product label, and the mitigation measures identified for this project, which are in conformity with guidelines set forth in the Region 6 Veg. Mgt. EIS.

Picloram

Picloram is very soluble in water and has the potential to leach into ground water depending on the character of the soil and the weather conditions. Picloram movement is greatest for soils with low organic matter content, alkaline soils, soils which are highly permeable, sandy, or light textured. Sunlight and microorganisms readily break-down picloram and thus it tends not to create long-term build-up problems in the soil. Under favorable conditions, picloram has been found to have a half-life of less than one month, and, under arid conditions, a half-life of greater than four years.

As with glyphosate, picloram would be applied only during the dry season, when there would be a reduced chance of rain to leach the herbicide through the soil profile. Since the half-life of picloram in the soil is only about one month, chances of leaching during the summer is minimal. The application would be directly to target plants to avoid soil contamination. Picloram would not be applied within 100 feet of live streams, rivers, lakes, wetlands, or ditches with standing water, in accordance with EPA requirements identified on the product label.

The potential for picloram to become introduced into live streams and affecting downstream water users would be negligible when the herbicide is applied in accordance with the EPA requirements identified on the product label, and using the mitigation measures identified for this project.

Triclopyr

Triclopyr is moderately persistent in soils and adsorbs more strongly with increased organic matter content. It is degraded by soil microbes and when in surface waters, is rapidly degraded by sunlight. No adverse effect on water quality is expected as a result of treating suitable site types with triclopyr when applying the chemical in accordance with EPA requirements identified on the product label, and the mitigation measures identified for this project.

Dicamba

Dicamba is very soluble in water and has the potential to leach into ground water depending on the character of the soil and the weather conditions. Dicamba movement is greatest for soils with low organic matter content, alkaline soils, soils which are highly permeable, sandy, or light textured. Soil microorganisms readily break-down dicamba and thus it tends not to create long-term build-up problems in the soil. The half-life of dicamba in the soil has ranged from one to six weeks.

As with glyphosate and picloram, dicamba would be applied only during the dry season, when there would be a reduced chance of rain to leach the herbicide through the soil profile. Since the half-life of dicamba in the soil is only about one month, chances of leaching during the summer is minimal. The application would be directly to target plants to avoid soil contamination. Dicamba would not be applied within 100 feet of live streams, rivers, lakes, wetlands, or ditches with standing water, in accordance with EPA requirements identified on the product label.

The potential for dicamba to become introduced into live streams and affecting downstream water users would be negligible when the herbicide is applied in accordance with the EPA requirements identified on the product label, and using the mitigation measures identified for this project.

Hexazinone

Hexazinone formulations are very soluble and have the potential for ground water contamination. Hexazinone is persistent in water in the soil where light is absent. The half-life for hexazinone is one to six months with low concentrations remaining in the soil for up to three years after application. Hexazinone is degraded primarily by soil microorganisms and light.

The application of hexazinone would be directly to target plants to avoid soil contamination. Hexazinone would not be applied within 100 feet of live streams, rivers, lakes, wetlands, or ditches with standing water, in accordance with EPA requirements identified on the product label.

Hexazinone does have the potential to move through buffer zones and into surface streams, though it degrades rapidly in surface waters when light stimulates chemical reactions. The potential for hexazinone to

become introduced into live streams and affecting downstream water users would be negligible when the herbicide is applied in accordance with the EPA requirements identified on the product label, and using the mitigation measures identified for this project.

Considering the nature and properties of each herbicide, and the manner it will be applied, no cumulative effect on water quality is expected from the proposed use of herbicides, within the IWM program, for this project.

In the long-term, wherever noxious weed infestations are successfully controlled, soil productivity, cover, and soil holding capabilities would improve as native vegetation recovers.

Economic Values

Infestations would be effectively controlled and lost opportunity costs to commercial operations noted for Alternative A would not occur. In addition, no additional noxious weed management costs would be shifted to private landowners as the spread of noxious weeds from the highway right of way would be controlled. There would be no negative impact on adjacent land values due to the lack of noxious weed control and their spread from the project area.

Alternative C would be the least expensive and most cost effective of the two action alternatives. The measure of difference between the two varies with the extent to which the IWM program specifies the use of herbicides. In general, the application of herbicides is a more cost effective treatment strategy than manual or mechanical operations. Alternative C does not propose to replace non-herbicide treatments. Under Alternative C herbicides would be a part of the IWM program and would be used in concert with other treatment methods in order to most effectively achieve the desired results.

The use of herbicides to achieve initial control of noxious weeds would be beneficial from a program cost standpoint for the following reasons:

1. Initial treatment, if performed correctly, would have a high probability of successfully eliminating existing weed populations. Repeated applications, with their associated costs, would not be necessary.
2. Elimination of noxious weed populations during initial treatment would greatly improve the probability that prevention strategies would be successful. There would be minimal costs associated with repeated attempts to establish a successful prevention program.
3. Initial control of noxious weeds with herbicides could be attained at approximately 5% of the cost of achieving the same results by hand pulling. More resources would therefore be available for the implementation of prevention strategies and other components of the IWM program.

BIBLIOGRAPHY

- Asher, J.E., BLM. 1994. "Explosion in Slow Motion: Impacts and Solutions for Rapidly Expanding Noxious Weeds". 1994 Washington State Weed Conference.
- Duncan, C.L. "Managing Russian Knapweed (*Acroptilon repens* (L.) DC, *Centaurea repens* L.) On Range and Pasture". Knapweed, October 1994.
- Lacey, C.A., Lacey, L.R., Fay, P.K., Storey, J.M., Zamora, D.L. 1992. Controlling Knapweed on Montana Rangeland. Montana State University Extension Service, Missoula, Montana.
- Lacey, J.R., Marlow, C.B., Lane, J.R. 1989. Influence of Spotted Knapweed (*Centaurea maculosa*) on Surface Runoff and Sediment Yield. Weed Tech. 3:627-631.
- Lacey, J.R., Olson, B.E. 1991. "Environmental and Economic Impacts of Noxious Range Weeds". In: Noxious Range Weeds, West View Press, pp. 5-16.
- Larson, L.L., McInnis, M.L. 1989. Impacts of Grass Seedlings Establishment and Density of Diffuse Knapweed and Yellow Starthistle. Northwest Science 63:4.
- Piper, G.L. "Knapweed Biological Control Agent Update". Knapweed, April 1993.
- Rice, P.M., Bedunah, D.J., Carlson, C.E. 1992. Plant Community Diversity After Herbicide Control of Spotted Knapweed. Research Paper INT-460. Ogden, UT: USDA Forest Service Intermountain Research Station. Pp. 1-6.
- Roche, B. "Management Technologies for Spotted Knapweed Control". Knapweed, December 1991.
- Sturko, A. "Biological Control of Diffuse and Spotted Knapweed in British Columbia". Knapweed, April 1993.
- USDA, Forest Service, Mt. Hood National Forest. 1994. Environmental Assessment for the Management of Noxious Weeds.
- USDA, Forest Service, Pacific Northwest Region. 1992a. A Guide to Conducting Vegetation Management Projects in the Pacific Northwest Region.
- USDA, Forest Service, Pacific Northwest Region. 1992b. Herbicide Information Profile - Glyphosate.

- USDA, Forest Service, Pacific Northwest Region. 1992c. Herbicide Information Profile - Picloram.
- USDA, Forest Service, Pacific Northwest Region. 1992d. Herbicide Information Profile - Triclopyr.
- USDA, Forest Service, Pacific Northwest Region. 1994a. Herbicide Information Profile - Dicamba.
- USDA, Forest Service, Pacific Northwest Region. 1994b. Herbicide Information Profile - Hexazinone.
- USDA, Forest Service, Willamette National Forest. 1993. Environmental Assessment for Integrated Weed Management, Willamette National Forest.
- USDA, Forest Service. 1988. Managing Competing and Unwanted Vegetation, Final Environmental Impact Statement.
- WA State Dept. of Agriculture, Dept. of Ecology, Dept. of Natural Resources, Dept. of Fisheries, Dept. of Wildlife, WA State Noxious Weed Control Board. 1993. Noxious Emergent Plant Management, Final Environmental Impact Statement.
- Washington State Department of Transportation. 1993. Roadside Vegetation Management, Final Environmental Impact Statement.
- Whitson, Tom D. (Ed). Weeds of the West (Revised, 1992 ed.). The Western Society of Weed Science with the Western United States Land Grant Universities Cooperative Extension Services and the University of Wyoming, 1992.
- William, R.D., Burril, L.C., Ball, D., Miller, T., Parker, R., Boerboom, C.M., Al-Khatib, K., Callihan, R.H., Eberlein, C., Morishita, D.W. 1994 Pacific Northwest Weed Control Handbook. Oregon State University, Washington State University, and University of Idaho, 1994.
- Youtie, B., Soll, J. "Non-Chemical Control of Diffuse Knapweed" (*Centaurea diffusa*). Knapweed, October 1994.